## **CLAIMS**

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## WHAT IS CLAIMED IS:

- 1. A medical article, comprising an implantable substrate having a coating deposited on the substrate, the coating comprising a polymer, the polymer being a product of copolycondensation of a diketene acetal and a diol.
  - 2. The article of Claim 1, wherein the implantable substrate is a stent.
- 3. The article of Claim 1, wherein the diketene acetal is selected from a group of compounds having formulae (I) or (II):

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O-H<sub>2</sub>C CH<sub>2</sub>-O

R-CH=C C C C=CH-R<sub>1</sub>

O-H<sub>2</sub>C CH<sub>2</sub>-O

(I)

$$C = CH - R_1 - CH = C - CH_2 - CH$$

wherein R, R<sub>1</sub>, R<sub>3</sub> and are, independently, unsusbstituted or substituted straight-chained,

20 branched, or cyclic alkyl radicals C<sub>1</sub>-C<sub>8</sub>, or unsusbstituted or substituted aryl radicals; and R<sub>2</sub> is a

straight chain or branched C<sub>1</sub> to C<sub>16</sub> alkyl group or a straight chain or branched C<sub>1</sub> to C<sub>16</sub> alkyl

group containing an ether group.

4. The article of Claim 1, wherein the diketene acetal is selected from a group consisting of 3,9-diethylidene-2,4,8,10-tetraoxaspiro-[5,5]-undecane, 3,9-dipentylidene-2,4,8,10-tetraoxaspiro-[5,5]-heptadecane, 3,9-dibutylidene-2,4,8,10-tetraoxaspiro-[5,5]-pentadecane, 3,9-dipropylidene-2,4,8,10-tetraoxaspiro-[5,5]-tridecane, and mixtures thereof.

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- 5. The article of Claim 1, wherein the diol comprises aliphatic, cycloaliphatic, aromatic, or organosilicon diols or blends or combinations thereof.
- 6. The article of Claim 5, wherein the aliphatic diols comprise alkylene glycols or oligoalkylene glycols.
- The article of Claim 6, wherein the alkylene glycols are selected from a group consisting of ethylene glycol, 1,2-propylene glycol, 1,4-butanediol, 1,5-pentanediol, 1,6-hexanediol, 1,7-heptanediol, 1,8-octanediol, 1,9-nonanediol, 1,10-decanediol, 1,11-undecanediol, 1,12-dodecanediol, 1,13-tridecanediol, 1,14-tetradecanediol, 1,15-pentadecanediol, 1,16-hexadecanediol, 1,3-propylene glycol, butane-1,3-diol, pentane-2,4-diol, hexane-2,5-diol, and mixtures thereof.
  - 8. The article of Claim 6, wherein the oligoalkylene glycols are selected from a group consisting of trimethylene glycol, tetramethylene glycol, pentamethylene glycol, hexamethylene glycol, poly(tetramethylene glycol), diethylene glycol, triethylene glycol, tetraethylene glycol, poly(tetraethylene glycol), poly(pentaethylene glycol), poly(hexamethylene glycol), poly(propylene glycol), and mixtures thereof.
  - 9. The article of Claim 5, wherein the cycloaliphatic diols are selected from a group consisting of *trans*-cyclohexanedimethanol, *cis*-cyclohexanedimethanol, 1,2-cyclobutanediol, 1,3-cyclobutanediol, 1,2-cyclohexanediol, 1,3-cyclohexanediol, 1,2-cyclohexanediol, 1,3-cyclohexanediol, 1,4-cyclohexanediol, 1,2-cycloheptanediol, 1,3-cycloheptanediol, 1,4-cyclohexanediol, and mixtures thereof.
  - 10. The article of Claim 5, wherein the aromatic diols are selected from a group consisting of *p* benzenedimethanol, *o* benzenedimethanol, *m*-benzenedimethanol, and mixtures thereof.

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- 11. The article of Claim 5, wherein the organosilicon diol is a carbinol-terminated poly(dimethyl siloxane).
- 12. The article of Claim 1, wherein a hydroxylated functional compound is additionally included in the polycondensation process.
- 13. The article of Claim 12, wherein the hydroxylated functional compound comprises poly(alkylene glycols), hydroxylated poly(N-vinyl pyrrolidone), dextran, dextrin, hyaluronic acid, derivatives of hyaluronic acid, poly(2-hydroxyethyl methacrylate), hydroxy functional poly(styrene sulfonate), hydroxy functional phosphoryl choline methacrylate polymers, polymers with both hydroxyl and phosphoryl choline functionality, heparin, or mixtures thereof.
  - 14. The article of Claim 13, wherein the poly(alkylene glycols) are selected from a group consisting of poly(ethylene glycol), poly(propylene glycol), poly(tetramethylene glycol), and poly(ethylene oxide-co-propylene oxide).
- 15. A medical device, comprising a coating, the coating comprising a polymer including a unit having a formula:

$$HO = \begin{bmatrix} R_3 - O \end{bmatrix}_{W} C O - CH_2 CH_2 - O CH_2 CH_2 - O CH_2 CH_2 - O CH_2$$

wherein:

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R and R<sub>1</sub> are, independently, unsusbstituted or substituted straight-chained, branched, or cyclic alkyl radicals C<sub>1</sub>-C<sub>8</sub>, or unsusbstituted or substituted aryl radicals;

R<sub>3</sub> is an aliphatic, cycloaliphatic, aromatic, or organosilicon group; and

"w" and "z" are integers, where the value of "w" is between 1 and 40, the value of "z" is between 9 and 700.

- 16. The device of Claim 15, wherein the aliphatic radicals are selected from a group consisting of n-butyl and n-hexyl.
- 17. The device of Claim 15, wherein the cycloaliphatic radicals are selected from a group consisting of *trans*-cyclohexyl and *cis*-cyclohexyl.
  - 18. The device of Claim 15, further comprising a polymer having a formula

$$HO = \begin{bmatrix} R_2 - O \end{bmatrix}_{\stackrel{\longleftarrow}{m}} C O - CH_2 CH_2 - O CH_2 - O CH_2 CH_2 - O CH_2 CH_2 - O CH_2 - O$$

wherein:

10 R<sub>2</sub>-O is a non-fouling moiety derived from a hydroxylated functional compound; R<sub>3</sub> is an aliphatic or cycloaliphatic group;

"m," "p," and "q" are all integers, where the value of "m" is between 5 and 500, the value of "n" is between 2 and 350, the value of "p" is between 1 and 20, and the value of "q" is between 10 and 550.

15 19. The device of Claim 18, wherein the hydroxylated functional compound comprises poly(alkylene glycols), hydroxylated poly(N-vinyl pyrrolidone), dextran, dextrin, hyaluronic acid, derivatives of hyaluronic acid, poly(2-hydroxyethyl methacrylate), hydroxy functional poly(styrene sulfonate), hydroxy functional phosphoryl choline methacrylate polymers, polymers with both hydroxyl and phosphoryl choline functionality, heparin, or mixtures thereof.

- 20. The device of Claim 19, wherein poly(alkylene glycols) are selected from a group consisting of poly(ethylene glycol), poly(propylene glycol), poly(tetramethylene glycol), and poly(ethylene oxide-co-propylene oxide).
- 21. A method for fabricating a coating for an implantable medical device, the method comprising applying a polymer onto the surface of the device, wherein the polymer comprises a product of co-polycondensation of a diketene acetal and a diol.
  - 22. The method of Claim 21, wherein the medical device is a stent.
  - 23. The method of Claim 21, wherein the diketene acetal is selected from a group of compounds having formulae (I) and (II):

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wherein R, R<sub>1</sub>, R<sub>3</sub> and are, independently, unsusbstituted or substituted straight-chained, branched, or cyclic alkyl radicals C<sub>1</sub>-C<sub>8</sub>, or unsusbstituted or substituted aryl radicals; and R<sub>2</sub> is a straight chain or branched C<sub>1</sub> to C<sub>16</sub> alkyl group or a straight chain or branched C<sub>1</sub> to C<sub>16</sub> alkyl group containing an ether group.

(II)

24. The method of Claim 21, wherein the diketene acetal is selected from a group

25 consisting of 3,9-diethylidene-2,4,8,10-tetraoxaspiro-[5,5]-undecane, 3,9-dipentylidene-2,4,8,10
tetraoxaspiro-[5,5]-heptadecane, 3,9-dibutylidene-2,4,8,10-tetraoxaspiro-[5,5]-pentadecane, 3,9
dipropylidene-2,4,8,10-tetraoxaspiro-[5,5]-tridecane, and mixtures thereof.

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- 25. The method of Claim 21, wherein the diol comprises aliphatic, cycloaliphatic, aromatic, or organosilicon diols or blends or combinations thereof.
- 26. The method of Claim 25, wherein the aliphatic diols comprise alkylene glycols or oligoalkylene glycols.
- 27. The method of Claim 26, wherein the alkylene glycols are selected from a group consisting of ethylene glycol, 1,2-propylene glycol, 1,4-butanediol, 1,5-pentanediol, 1,6-hexanediol, 1,7-heptanediol, 1,8-octanediol, 1,9-nonanediol, 1,10-decanediol, 1,11-undecanediol, 1,12-dodecanediol, 1,13-tridecanediol, 1,14-tetradecanediol, 1,15-pentadecanediol, 1,16-hexadecanediol, 1,3-propylene glycol, butane-1,3-diol, pentane-2,4-diol, hexane-2,5-diol, and mixtures thereof.
  - 28. The method of Claim 26, wherein the oligoalkylene glycols are selected from a group consisting of trimethylene glycol, tetramethylene glycol, pentamethylene glycol, hexamethylene glycol, poly(tetramethylene glycol), diethylene glycol, triethylene glycol, tetraethylene glycol, poly(tetraethylene glycol), poly(pentaethylene glycol), poly(hexamethylene glycol), poly(propylene glycol), and mixtures thereof.
  - 29. The method of Claim 25, wherein the cycloaliphatic diols are selected from a group consisting of *trans*-cyclohexanedimethanol, *cis*-cyclohexanedimethanol, 1,2-cyclobutanediol, 1,3-cyclobutanediol, 1,2-cyclopentanediol, 1,3-cyclohexanediol, 1,2-cyclohexanediol, 1,2-cyclohexanediol, 1,3-cyclohexanediol, 1,4-cyclohexanediol, 1,4-cyclohexanediol, and mixtures thereof.
  - 30. The method of Claim 25, wherein the aromatic diols are selected from a group consisting of *p*-benzenedimethanol, *o*-benzenedimethanol, *m*-benzenedimethanol, and mixtures thereof.

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- 31. The method of Claim 25, wherein the organosilicon diol is a carbinol-terminated poly(dimethyl siloxane).
- 32. The method of Claim 21, wherein a hydroxylated functional compound is additionally included in the polycondensation process.
- 33. The method of Claim 32, wherein the hydroxylated functional compound comprises poly(alkylene glycols), hydroxylated poly(N-vinyl pyrrolidone), dextran, dextrin, hyaluronic acid, derivatives of hyaluronic acid, poly(2-hydroxyethyl methacrylate), hydroxy functional poly(styrene sulfonate), hydroxy functional phosphoryl choline methacrylate polymers, polymers with both hydroxyl and phosphoryl choline functionality, heparin, or mixtures thereof.
  - 34. The method of Claim 33, wherein the poly(alkylene glycols) are selected from a group consisting of poly(ethylene glycol), poly(propylene glycol), poly(tetramethylene glycol), and poly(ethylene oxide-co-propylene oxide).

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